Articles

Screening and Diagnosis of Alcoholism in the Primary Care Setting

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As many as 20% of patients seeing their primary physicians may suffer from alcohol abuse and dependence. Often the problem goes unrecognized. In this article I summarize what is known regarding the natural history, risk factors, and available screening techniques for alcoholism. Ultimately, a diagnosis of alcoholism is based on a patient's history, and there are various approaches to obtaining a thorough alcohol history and overcoming patient denial regarding an alcohol problem. Primary physicians have an important role in educating patients about alcoholism.

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There is no agreed-on definition of alcoholism. In 1976 the National Council on Alcoholism and the American Medical Association gave the following definition: "A chronic, progressive and potentially fatal disease . . . characterized by tolerance, physical dependence and/or pathological organ changes . . . [as a] consequence of . . . alcohol."[1] Most researchers, however, acknowledge a spectrum of disease, with no clear demarcation between normal and pathologic drinking.

Vaillant performed longitudinal studies of men in Boston, helping to define the spectrum of alcoholism.[2] According to his findings, heavy social drinkers drink about three to five drinks a day and are asymptomatic. Many never have problems, but a significant proportion (10% to 15%) progress to alcohol abuse, defined by the development of symptoms. At this stage, the men usually drink more than seven drinks a day and have social, psychological, medical, legal, and occupational problems related to their drinking. A few persist in this stage, but almost 50% revert to heavy social drinking. The rest, between 25% and 30% of men who abuse alcohol, become alcohol dependent. At this stage, they suffer from withdrawal symptoms and require detoxification. About 3% to 5% of men reach this stage. It is important to note that the amount consumed is not central to these definitions.[2]

The *Diagnostic and Statistical Manual of Mental Disorders,* third edition, revised (DSM-III-R) similarly defines alcohol abuse and dependence along a spectrum of alcohol use (Table 1).[3] A diagnosis of *alcohol dependence* requires at least three of nine manifestations lasting at least a month or recurring repeatedly over a longer time. A diagnosis of *alcohol abuse* requires only the use of alcohol when physically hazardous (item 4) or continued alcohol use despite alcohol-related problems (item 6), with the same time requirements as alcohol dependence. In this article I use these definitions of alcohol abuse and dependence, except when explicitly stated. The term "alcoholism" refers to the entire spectrum of alcohol abuse to dependence.

Prevalence of Alcohol Abuse and Dependence

Alcohol abuse and dependence are common, with their exact prevalence depending on the definition used. The prevalence in the general population is usually assumed to be 5% to 10%.[4] A study by Robins and colleagues of 9,000 households in the St Louis, Missouri; Baltimore, Maryland; and New Haven, Connecticut, areas, however, found a higher prevalence rate of 11.5% to 15.7%.[5] Studies of medical clinic patients have demonstrated a prevalence rate of 11% to 21%.[6-10] Several studies that documented a lower prevalence were not based on interviews but used only self-administered screens.[11,12]

The prevalence of alcoholism in visitors to emergency departments during the day is similar to that in clinics but, according to one study, increases to 29% at night.[13] Patients admitted to hospital have rates of alcoholism between 10% and 50%, with a recent study at Johns Hopkins University (Baltimore, Md) reporting a 25% prevalence of alcohol abuse among medical service inpatients.[14]

Risk Factors for Alcoholism

Gender

Alcoholism is commonly thought to be three to four times more prevalent in men than in women, but data are incomplete.[15] Most studies of alcoholism have been limited to men, and screens commonly used in research were developed based on male populations. The prevalence of alcoholism in women is increasing, and many studies showing a gender difference in the prevalence of alcoholism were completed more than 20 years ago.[16] Nevertheless, the more recent study by Robins and co-workers revealed a fourfold difference between the prevalence of alcohol abuse in men (19% to 29%) and women (4% to 5%) using DSM-III criteria. Alcohol abuse was the most prevalent psychiatric disorder among men 24 to 64 years old but was not among the top four psychiatric diagnoses in women older than 24.[5]

The prevalence of alcoholism among women visiting primary care providers may, however, be greater than that in the general population. Studies of gynecologic practices have found 12% to 16% of patients to be heavy drinkers, suggesting a greater prevalence of alcoholism among women patients than in the female population as a whole.[16] In addition, women who abuse alcohol have more acute and chronic complications of alcohol use than men.[17,18]

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ABBREVIATIONS USED IN TEXT

DSM-III-R = *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised
GGT = γ-glutamyl transferase
MAST = Michigan Alcoholism Screening Test

Ethnicity

Vaillant's longitudinal studies found men of Northern European ancestry—Irish, English, French—to be four to seven times more likely than those of Mediterranean descent—Italian, Jewish, Lebanese, Turkish—to develop alcohol dependence.[2] Native Americans are also at increased risk for alcoholism, although the prevalence rates vary considerably among tribes and abstention is also higher in this population than in the United States population in general. In contrast, Asian Americans and Pacific Islanders as a group have a lower overall risk of having alcoholism than the rest of the US population. Some subgroups, however (such as native Hawaiians, Japanese, and Filipinos), have rates of alcoholism approaching that of the US population as a whole.[19] African Americans and Hispanics both have distinctive patterns of alcohol abuse and dependence but appear to have an overall risk of alcoholism similar to that of the US population at large.[5,19]

Family History

Even when ethnicity is controlled for, family history is a strong predictor of alcohol abuse and dependence, apparently because of an inherited predisposition.[20] Identical twins of alcoholic parents have a greater than 60% concordance rate of alcoholism, whereas the concordance between fraternal twins is only 30%. Adoption studies similarly show that heredity plays a large role in alcoholism; sons of alcoholic persons raised away from their parents have a four times greater risk of alcoholism than controls, whereas sons of nonalcoholic persons raised by alcoholic parents have no increased risk.[21,22] Men with more than one alcoholic parent or two alcoholic relatives appear to be about three times more likely to become alcohol dependent than those with no alcoholic relatives.[2] Blum and colleagues recently reported that a gene on chromosome 11 may confer susceptibility to alcoholism; however, this conclusion has been called into question by subsequent work.[23,24]

TABLE 1.—*Criteria for Alcohol Abuse and Dependence**

1. Alcohol often taken in larger amounts, or over a longer period, than the person intended
2. Persistent desire, or one or more unsuccessful efforts, to cut down or control alcohol use
3. A great deal of time spent in activities necessary to get alcohol, taking the substance, or recovering from its effects
4. Frequent intoxication or withdrawal symptoms when expected to fulfill major role obligations at work, school, or home or when alcohol is physically hazardous
5. Important social, occupational, or recreational activities given up or reduced because of alcohol
6. Continued alcohol use despite the knowledge of having a persistent or recurrent social, psychological, or physical problem that is caused or exacerbated by the use of the substance
7. Marked tolerance: need for markedly increased amounts of the substance in order to achieve intoxication or the desired effect, or markedly diminished effect with continued use of the same amount
8. Characteristic withdrawal symptoms
9. Alcohol often taken to relieve or avoid withdrawal symptoms

*From *Diagnostic and Statistical Manual of Mental Disorders*, third edition, revised.[3]

TABLE 2.—*Signs and Symptoms Suggestive of Alcohol Abuse**

Symptoms
Heartburn or gastrointestinal upset
Morning cough or headache, with or without nausea and vomiting
Anxiety, tension, and stress
Insomnia
Concentration or memory deficit
Signs
Tachycardia
Hypertension
Tremor
Purpura or ecchymosis
Palmar erythema
Scars from trauma
Gynecomastia
Hepatic enlargement or abdominal tenderness
Spider nevi
Sensitivity regarding the topic of alcohol
Positive Laboratory Findings
Hyperglycemia
Hyperuricemia
Macrocytosis
Elevated AST level
Elevated HDL-cholesterol level

AST = aspartate aminotransferase, HDL = high-density lipoprotein

*From Davis[27] and Holt et al.[28]

Antisocial Personality

Alcoholism is common in patients with antisocial personality disorder, and Vaillant found boys with behavioral problems in school to be three times more likely to become alcohol dependent than those without such problems.[2] In contrast, psychiatric instability, unhappy childhoods, depression, and anxiety, while possibly increasing the severity of alcoholism, do not appear to be independent risk factors.[2]

Age

In men, heavy drinking usually begins in the teens and 20s, with the highest prevalence of alcohol-related problems occurring in this age group. According to a study by Myers and associates, alcohol abuse continues in 11% to 13% of men aged 25 to 44 years and then appears to decrease, with only 3% to 4% of those older than 65 abusing alcohol.[25] Women apparently begin problem drinking later, but alcoholic complications develop at a similar age in women as in men (in their 40s and 50s) because of a poorly understood telescoping of the disease.[16]

Occupation

Persons who are unemployed or working in occupations that include access to alcohol on the job (bartending), coworker pressure to drink (diplomatic service), minimal supervision (traveling sales), high job stress (professionals), or a lack of routine (writing) may have an increased risk of alcohol abuse and dependence.[26]

Screening for Alcoholism

Many symptoms, signs, and abnormal laboratory values can be clues to the presence of alcoholism (Table 2). Al-

though these findings are neither sensitive nor for the most part specific, they can serve as reminders to consider and screen for alcohol abuse.[27,28]

Quantity and Frequency of Drinking

According to a Rand Corporation study, most patients accurately report their frequency of drinking and the quantity they consume.[29] People who abuse alcohol, however, frequently do not drink daily and underreport the amount they consume when they do drink, making questions about frequency and quantity of alcohol consumed insensitive, although specific, screens. Cyr and Wartman's study of a general medical clinic population with a 20% prevalence of alcohol abuse found that daily drinking was only 34% sensitive and drinking four or more drinks a day was only 46% sensitive for alcohol abuse or dependence.[7] Despite specificities of 94% to 96%, the positive predictive values of these questions were only 59% and 76%, respectively. The negative predictive values, however, were 85% and 87%, respectively.[7]

History of Trauma

Skinner and co-workers found that more than two positive answers to five questions about a history of trauma since age 18 distinguished most alcoholic from nonalcoholic persons (Table 3).[30] The sensitivity and specificity of these questions in a family practice population, however, were only 67% and 70%, respectively.[30] Combining a trauma score with a laboratory screen makes them more sensitive (86%) and specific (83%) but requires a logistic regression, making this approach impractical. Perhaps the most useful findings of Skinner and co-workers for primary care physicians were that injuries from a fight or after drinking had specificities of 91% and 93%, respectively, for alcohol abuse.[30]

CAGE Screen

The CAGE screen (Table 4) comprises four questions taken from the Michigan Alcoholism Screening Test (MAST), a 25-question alcoholism screen used largely in a research setting. Two "yes" answers indicate the presence of alcoholism.[31]

TABLE 3.—*Skinner's Trauma Scale for Alcoholism**

History of Trauma	Sensitivity, %	Specificity, %
Have you had fractures or dislocations?	88	59
Have you ever been injured in a motor vehicle accident?	59	74
Have you injured your head?	85	76
Have you been injured in an assault or fight?	69	91
Have you been injured after drinking?	88	93

*From Skinner et al.30

TABLE 4.—*CAGE Questions**

Have you ever felt you ought to Cut down on your drinking?

Have people Annoyed you by criticizing your drinking?

Have you ever felt bad or Guilty about your drinking?

Have you ever had a drink in the morning (Eye opener) to steady your nerves or get rid of a hangover?

*From Mayfield et al.3

The CAGE screen is the most commonly recommended screen for alcoholism in the primary care setting because it is short and relatively easy to remember. It has several problems, however. The widely quoted sensitivity of 97% and specificity of 94% are not applicable in outpatient general medical populations because Ewing derived them from a population of extremes: 166 alcoholic men in rehabilitation and 68 nonalcoholic hospitalized men.[32] Ewing's study, therefore, overestimates the screen's sensitivity and specificity in identifying persons who abuse alcohol. In other studies of patients admitted to hospital, a positive CAGE screen has had a sensitivity of 75% to 91% and a specificity of 77% to 96%.[31,33,34]

The CAGE screen has not been prospectively validated in any large primary care population or in women.* In the only large outpatient study of the CAGE screen from Britain, its sensitivity for identifying "excessive drinkers"—more than 35 drinks per week for men and 21 drinks per week for women—was only 55% in men and 35% in women.[35] Moreover, despite its convenience, there is extensive evidence that physicians do not use the CAGE questions,[10,33] and the value of the screen as a self-administered questionnaire is unknown.

When the CAGE screen is used, what does a positive result mean? The predictive value of the screen is dependent on the pretest probability of alcoholism, which in turn depends on its prevalence in the screened population and on an individual patient's risk factors. Assuming a pretest probability of 20% and the sensitivities and specificities described in hospitalized patients, the positive predictive value would be 50% to 82% for two yes answers and 89% for three yes answers. The negative predictive value would be 94% to 97% if two yeses are considered a positive result and 92% if three yeses are required.

Proposed Two-Question Screen

Using the MAST as a gold standard, Cyr and Wartman found that two simple questions, "Have you ever had a drinking problem?" and "When was your last drink?" could identify most alcohol abusers in an outpatient setting.[7] When the response to either question was positive (drinking within the past 24 hours was considered positive), the test had a sensitivity of 92% and a specificity of 90%. In a population of 232 new general medical clinic patients with a 20% prevalence of alcohol abuse, the positive predictive value of this screen was 69% and the negative predictive value was 98%. Subsequent studies of elderly veterans and women, however, have found the test to be less useful in these populations.[36,37]

Other Interview Screening Tests

Additional screening tests for alcoholism have been developed, many derived from the MAST. While they are probably as effective as the CAGE screen, they are more difficult to remember; therefore, they will not be reviewed here.[9,12,38,39]

Laboratory Tests

No good laboratory screen is available for alcohol abuse, although many tests have been studied, including mea-

*Since final acceptance of this article for publication, a large study of outpatients indicates that the sensitivity and specificity of the CAGE in outpatients is indeed comparable to that observed previously in inpatients (Buchsbaum DG, Buchanan RG, Centor RM, Schnoll SH, Lawton MJ: Screening for alcohol abuse using CAGE scores and likelihood ratios. Ann Intern Med 1991; 115:774-777).

surements of mean corpuscular volume, aspartate aminotransferase, γ-glutamyl transferase (GGT), high-density lipoprotein, and uric acid. Of the laboratory tests studied, GGT is the most sensitive and widely available, with a sensitivity of 33% to 54% and a specificity ranging from 76% to 89%.[30,33,34]

Initially, a carbohydrate-deficient form of transferrin was found to be highly sensitive and specific for alcohol abuse.[40,41] In a recent study, however, of a family practice population with a 12% prevalence of "excessive drinking," the transferrin index had a sensitivity of only 45% and a specificity of 89%. The positive predictive value was 50%, and the negative predictive value was 86%. This is as good as available laboratory screens but not better, as had been hoped.[42]

Other proposed biochemical screening tests are platelet monoamine oxidase inhibition by alcohol and adenylate cyclase activity in platelets and lymphocytes. Preliminary findings suggest that when these two tests are combined, they correctly differentiate 75% of alcoholic and nonalcoholic patients. Whether these tests screen for a genetic predisposition to alcohol abuse or for the effects of heavy drinking is not yet clear.[43]

Diagnosing Alcoholism

Given that no gold standard test is available for alcohol abuse or dependence, if screening suggests that a patient has an alcohol problem, the diagnosis must be pursued through additional history taking. The goal of the alcohol history is to encourage patients to talk about any alcohol-related problems they have had, for this is what defines alcohol abuse. A history of withdrawal helps identify patients likely to be alcohol dependent.

Many approaches to an alcohol history have been recommended.[2,44-46] A direct but nonthreatening question, such as "Have you ever in the past thought that you might drink too much?" is often remarkably rewarding. The chronology of the patient's drinking, with special attention to increasing tolerance and alcohol-related problems—motor vehicle accidents or relationship and job difficulties—can also be useful. A question such as "Tell me about when you started drinking and how your drinking pattern has changed since then" can get a patient started. Alternatively, if a patient has answered yes to a CAGE question, an interviewer might seek an explanation: "You mentioned that you had once felt you ought to cut down on your drinking; can you tell me more about that?" If a patient answers yes to the screening question, "Have you ever had an alcohol problem?" the physician might similarly ask "When was that?" and "What sort of problems did you have?" Many other questions, covering all nine criteria of the DSM-III-R, have been recommended in obtaining a full alcohol history. One efficient approach is for the physician or a mental health worker to administer the MAST.

When taking an alcohol history, special attention should be paid to evidence of denial, a fairly specific sign of alcohol abuse. For instance, an alcoholic patient might display inappropriate emotions (such as joking or anger) or might change the topic to avoid discussing an alcohol problem.

Communicating the Diagnosis

Once a clinician determines that a patient has a drinking problem, the diagnosis must be communicated in an explicit yet empathic and hopeful manner.[44,47] The basis of the clinical impression can be explained. Each piece of evidence—the prevalence, the patient's risk factors, suggestive symptoms, positive screening tests, components of the alcohol history, and any signs and laboratory data that suggest the diagnosis—should be included in the discussion.[47]

When communicating a diagnosis of alcoholism, physicians should again expect denial. Some patients will express relief, but many will become anxious, annoyed, amused, or impatient, trying unconsciously to block a discussion of alcoholism. These emotional responses strengthen the likelihood that the original clinical impression was accurate and require that physicians be gentle in presenting a diagnosis of alcoholism while remaining unswayed by the patient's denial. Being hopeful and supportive can help patients confront what is usually a frightening diagnosis,[44] and there is evidence that empathy and optimism on the part of caretakers improve patients' chances for recovery.[48]

Overcoming Denial

If a diagnosis of alcohol abuse or dependence is denied by a patient, several approaches to overcoming denial have been suggested.[44,47] Although controversial, a trial of controlled drinking will often show patients that they are not in control of their drinking. They can be instructed to drink two drinks, no more and no less, every day for three months, with return visits scheduled to discuss their successes and failures.[49] Having a family member present when an alcohol problem is discussed may be helpful, depending on the level of the family member's denial.

Referring patients to an open Alcoholics Anonymous meeting, or recommending that they talk with friends who are members of Alcoholics Anonymous, may help them identify with other alcoholic persons, thereby diminishing their denial. Persons in early stages of alcohol abuse may be unable to identify with those involved with Alcoholics Anonymous, however. Alternatively, alcohol or substance abuse counselors and some psychologists and psychiatrists can help patients confront the diagnosis. The National Council on Alcoholism provides consultations and has offices in many areas. A formal "intervention," a meeting orchestrated by a mental health professional in which persons important to a patient—family, friends, co-workers—confront him or her with the problems resulting from excessive drinking, often forces a patient to acknowledge a drinking problem.[49]

Formal testing using an instrument such as the MAST can provide objective evidence of alcohol-related problems, as can a blood alcohol measurement. Alcohol abuse is considered present if the blood alcohol level is more than 22 nmol per liter (100 mg per dl) in a patient being seen for a general examination, more than 33 nmol per liter (150 mg per dl) in a patient without signs of intoxication, or more than 65 nmol per liter (300 mg per dl) at any time. The blood alcohol level can be estimated by multiplying the osmolality gap by 4.5 (osmolality gap = measured osmolality − [2 × Na + glucose/18 + blood urea nitrogen/2.8]).[50]

Educating Patients

Even when patients deny having alcohol-related problems, providers can educate them about alcoholism and explain that alcoholism is a chronic, treatable disease. Most patients are unaware that the first symptoms of alcohol abuse are usually social problems with relationships, work, or the law, and they can be cautioned to watch for such problems.

Many patients also do not understand that more than 25% of men who abuse alcohol will become alcohol dependent. They can be advised that entering treatment before irreversible social and physical consequences of alcohol abuse occur improves their likelihood of recovery.[51]

Pointing out the strong genetic component to alcohol abuse can help decrease patients' guilt. Physicians can explain that, because of a biologic predisposition, some persons feel the effects of alcohol less, perhaps resulting in their observed inability to know when to stop drinking. Drinking poses an increased risk to them; they may be more apt to become tolerant and subsequently dependent. Therefore, providers can recommend abstinence as a means to prevent progression of the disease.

Physicians can also educate patients about the immediate risks of continued drinking. The fetal alcohol syndrome appears to be dose related, but a safe dose has not been determined. Currently it is the third most frequent cause of birth defects in the United States, affecting 3 of every 1,000 live births annually.[16] Women should be counseled to stop drinking if they are considering becoming pregnant. Patients can also be advised not to drive after drinking[52] and informed of the recently documented risk of swimming while intoxicated.[53] Finally, physicians can stress to patients that heavy drinking will change the way they metabolize drugs. They may suffer from inadequate or toxic drug levels of over-the-counter or prescribed drugs as a result of heavy drinking. Alcohol-abusing patients should be warned about their increased risk of acetaminophen toxicity.[54-56]

Conclusion

Alcoholism is prevalent among patients in primary care settings. Risk factors and screening tests can alert clinicians to possible alcohol-related problems, but a diagnosis of alcohol abuse or dependence should be founded on a thorough alcohol history. When discussing alcohol-related problems with patients, denial should be expected. Scheduling a return visit to readdress an alcohol-related problem is often required to overcome vehement denial. At a minimum, alcohol-abusing patients can be educated about the risks of continued drinking. In this way, practitioners can express their concern and openness and be available when patients want help.

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MEANING MENOPAUSE

My gynecologist calls it
ovarian failure.
I didn't make this up,
nor did he. He learned it
in medical school,
reads it in journals,
says it casually
to his colleagues,
who say it back to him.
Every day he flunks
his patients with it
and they take it on the chin,
but when he serves it
up to me, something snaps.
How funny he looks,
clenching a speculum
in his gloved hand,
trying to calm me
while I shriek like a fury
and challenge him
to evict me in my paper gown.
His eyes travel furtively
to his watch as he recalls
his waiting room
now full to overflowing
with women whose
ovaries are failing
even as they turn the pages
of their magazines. Too bad,
I am going to lie right here,
howling and kicking my feet
on the stirrups
until he recants—this man
so certain of his truth,
whose testicles
know nothing but success.

DORI APPEL©
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